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**west virginia** department of environmental protection

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## **ENGINEERING EVALUATION / FACT SHEET**

### **BACKGROUND INFORMATION**

Application No.:	R14-017C
Plant ID No.:	019-00001
Applicant:	WVA Manufacturing, LLC
Facility Name:	Alloy Facility
Location:	Fayette County
NAICS Code:	331112
Application Type:	Modification
Received Date:	February 8, 2012
Engineer Assigned:	Steven R. Pursley, PE
Fee Amount:	\$1,000
Date Received:	February 10, 2012 (\$300); March 13, 2012 (\$700)
Complete Date:	April 11, 2012
Due Date:	July 10, 2012
Applicant Ad Date:	March 15, 2012
Newspaper:	<i>The Fayette Tribune</i>
UTM's:	Easting: 476.01 km      Northing: 4,220.96 km      Zone: 17
Description:	Revision to increase furnace emissions. Includes netting analysis to net out of PSD by shutting down boiler #4.

### **DESCRIPTION OF PROCESS**

Raw materials arrive at the plant via truck, barge and/or rail car. The raw materials are either stored or taken directly to the mix house via rail car or truck. At the mix house, the material is dumped into a designated bin(s), where, depending on furnace demand, a portion of each material is automatically weighed, layered onto a conveyor and delivered into a batch delivery system which dumps the material into the desired furnace bin. The raw material mix is then added to the top of the furnace and stoked down into the furnace. As the material travels through the furnace (gravity fed), the heat provided by the electric arc (from the electrode to the furnace hearth) converts the mix into the ferroalloy product. Periodically, the furnace is tapped by opening with a drill, shotgun or other device and the metal is collected into a ladle. Refining material is added to the ladle and the metal is agitated. During the late stage of refining or after the refining process, the tap hole is

plugged manually or with the use of a plugging gun. Once the refining process is complete and the tap hole closed, the ladle is removed from the tapping area by an overhead crane to the casting area, where the metal is poured into a series of cast iron chills. From the chills, the metal is placed into cooling bins. The metal is then loaded into a truck and delivered to a packing bin. Once a full bin has been collected, the metal is picked up with an endloader and either transferred to a crushing/sizing system via truck or taken to the system by the endloader. The metal is then crushed, sized and packaged. Finally the product is delivered to the customer via rail car, truck or barge.

The fume and dust from the top of the furnace and the taphole are collected and transferred to a baghouse(s). The dust from the baghouse is then either transferred via piping to Elkem Materials, Inc. as a raw material for their process or disposed of by truck as a waste at the company's Jarrett Branch Landfill.

After the metal is emptied from the ladle, the remaining material (slag, metal, etc.) is emptied into a holding bin, allowed to cool and then taken by truck or endloader to an outside storage area. The slag is loaded into trucks or rail car and sold as a separate product.

### *Background and Description of Requested Changes*

Several stacktests in the last few years have indicated that emissions from Furnace 15 routinely violate their emission limits. As a result, consent order R14-E-2011-20 was issued (see said consent order for specifics as to testing results between 2004 and 2011). As part of the consent order, WVA Manufacturing agreed to submit a permit application to increase permitted emissions from the furnace while "netting out" of PSD by agreeing to permanently shutting down Boiler #4. Specifically, the requested changes to the permit are:

1. Remove all references to Boiler #4, it's electrostatic precipitator and its associated stack due to its permanent shutdown. A new condition is also proposed requiring that Boiler #4 be shut down and never restarted.
2. Revise allowable hourly and annual emission limits for Submerged Electric Arc Furnace 15 (EAF 15).

### SITE INSPECTION

No site inspection of the facility was performed. The writer has been to the facility numerous times. Additionally, the facility was inspected by James Robertson of DAQs enforcement section less than one year ago (May 3, 2011). As noted above the facility is out of compliance due to Furnace 15 emission exceedances which will be addressed by this permit.

The facility sits in a narrow valley and is adjacent to the Kanawha River (which is used to generate some of the facility's electric power) approximately 30 miles southeast of Charleston, WV on U.S. Route 60.

#### ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Proposed emissions from EAF 15 will be as indicated below. Note that these emissions are simply the existing PTE, proposed PTE and change in PTE from the furnace and boiler. For the actual netting analysis see the "Regulatory Applicability" section of this evaluation. Additionally, note that PM emissions are not included since they are not changing (although obviously there will be a decrease due to the shutdown of the boiler). The new EAF emissions are based on previous stack testing (except for SO<sub>2</sub>) with significant cushions built in to prevent a repeat of emission exceedances. Particularly, the NO<sub>x</sub> limit contains a large cushion to account for spikes resulting from "blows" in the furnace mix during the time of testing. Additionally, the SO<sub>2</sub> limit is based on a mass balance and contains a large cushion in order to accommodate the possibility of using higher sulfur coal/charcoal in the raw materials.

#### New EAF Permit Limits

Pollutant	lb/hr	TPY
SO <sub>2</sub>	175.61	737.56
NO <sub>x</sub>	110.0	462.0
CO	57.88	243.11
VOCs	4.15	17.44

#### Existing EAF Permit Limits

Pollutant	lb/hr	TPY
SO <sub>2</sub>	68.7	288.54
NO <sub>x</sub>	40.9	171.81
CO	54.0	226.98
VOCs	3.54	15.51

#### Existing Boiler #4 Permit Limits

Pollutant	lb/hr	TPY
SO <sub>2</sub>	930.6	4,076
NO <sub>x</sub>	367.2	1,608
CO	12.8	53.6
VOCs	1.54	6.4

#### Emission Decrease

Pollutant	lb/hr	TPY
SO <sub>2</sub>	-823.69	-3,626.98
NO <sub>x</sub>	-298.1	-1317.81
CO	-8.92	-37.47
VOCs	-0.93	-4.47

#### REGULATORY APPLICABILITY

The modification is subject to the following state and federal rules:

#### STATE RULES

45CSR7: To Prevent and Control Particulate Air Pollution From Manufacturing Process Operations

The allowable particulate matter (PM) stack emission rate for the furnace, identified as a Type “b” source operation, per 45CSR7, Section 4.1, is 29.03 lbs/hr based on a process weight rate of 43,420 lbs per hour process weight rate (from Elkem’s original 2000 permit application). PM emissions from EAF 15 are limited in the existing permit to 26.57 pounds per hour. This limit will not change.

Note that the acid mist limits contained in 45CSR7 table 45-7B do not apply to the boiler because it is regulated by 45CSR2 (see exemption 45-7-10.1).

45CSR10: To Prevent and Control Air Pollution from the Emission of Sulfur Oxides.

EAF 15 is subject to the 2000 ppm sulfur dioxide standard of 45CSR10.4. The SO<sub>2</sub> concentration from the EAF stack should be approximately 49 ppm based on the proposed permitted SO<sub>2</sub> limit, a stack gas temperature of 200°F and a stack flow rate of 451,454 acfm.

45CSR13: Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Temporary Permits, General Permits, and Procedures for Evaluation.

The modification is subject to 45CSR13 because the increased PTE from the EAF exceeds 6 pounds per hour and 10 tons per year of SO<sub>2</sub> and NO<sub>x</sub>.

Initially, the applicant submitted the application as an administrative update. As an administrative update, WVA Manufacturing submitted a \$300 application fee and noted that the application was for an administrative update in their required legal ad. Upon that submittal, WVA Manufacturing was notified by DAQ that they would have to apply for a modification since the submittal included netting and there is no provision for netting under 45CSR13 and no provisions for administrative updates under 45CSR14. Therefore, WVA Manufacturing then reran their legal ad to note that the application was a modification and submitted the additional \$700 fee.

45CSR14: Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration.

### ***Determination of Existing Major Source Status***

The plant is located in an area - Fayette County - classified as "in attainment" with all National Ambient Air Quality Standards (NAAQS) and, therefore, the major source status of the source is determined under 45CSR14.

The existing plant is a silicon metal production plant. With the shut down of Boiler #4, the facility will no longer be a 100 ton per year "listed source" under §45-14-2.43(a). Therefore, the facility will now be subject to a threshold of 250 tons per year per §45-14-2.43(b). The existing unmodified source has a PTE -based on calculations provided by the applicant in their Title V permit application - of well over 250 tons per year of CO, TSP, SO<sub>2</sub>, and NO<sub>x</sub>. This PTE defines the source as an existing major stationary source under 45CSR14.

## ***Determination of Major Modification***

The first step in determining whether a change is a “major modification” is determining whether a “physical change in or change in the method of operation of a major stationary source,” is occurring. The emission increases from this application are due in part to a change in the quality of raw material coal the applicant has been receiving. It should be noted that the change in a raw material for which the facility was already “capable of accomodating” is specifically excluded from the definition of a “major modification” by 45CSR14.2.40.e unless “such change would be prohibited under any federally enforceable permit condition which was established after January 6, 1975”. The original 2000 PSD permit established emission limitations which effectively prohibited the use of said raw material coal. Additionally, the original PSD permit application and subsequent permit relied on netting which would effectively prevent any of the proposed emission increases. A “major modification” is defined under section 2.40 of 45CSR14 as a:

. . . physical change in or change in the method of operation of a major stationary source which results in: a significant emissions increase (as defined in subsection 2.75) of any regulated NSR pollutant (as defined in subsection 2.66); and a significant net emissions increase of that pollutant from the major stationary source. [. . .]

Section 3.4 of 45CSR14 provides guidance on the process of determining if proposed changes are a major modification. §45-14-3.4(a) states that:

. . . consistent with the definition of major modification contained in subsection 2.40, a project is a major modification for a regulated NSR pollutant if it causes two types of emissions increases -- a significant emissions increase (as defined in subsection 2.75), and a significant net emissions increase (as defined in subsections 2.46 and 2.74). The proposed project is not a major modification if it does not cause a significant emissions increase. [. . .]

Therefore, for the proposed changes to meet the definition of a major modification, the changes themselves must result in a significant emissions increase. The methodology for calculating the emissions increase under the first step is given under Sections 3.4(b), 3.4(c), 3.4(d) and 3.4(f). The substantive language of each is given below:

### **[§45-14-3.4(b)]**

The procedure for calculating (before beginning actual construction) whether a significant emissions increase (i.e., the first step of the process) will occur depends upon the type of emissions units being modified, according to subdivisions 3.4.c through 3.4.f.

### **[§45-14-3.4(c)]**

Actual-to-projected-actual applicability test for projects that only involve existing emissions units. -- A significant emissions increase of a regulated NSR pollutant is projected to occur if the sum of the difference between the projected actual emissions (as defined in subsection 2.63) and the baseline actual emissions (as defined in subdivisions 2.8.a and 2.8.b), for each existing emissions unit, equals or exceeds the significant amount for that pollutant (as defined in subsection 2.74).

### **[§45-14-3.4(d)]**

Actual-to-potential test for projects that only involve construction of a new emissions unit(s).  
– A significant emissions increase of a regulated NSR pollutant is projected to occur if the

sum of the difference between the potential to emit (as defined in subsection 2.58) from each new emissions unit following completion of the project and the baseline actual emissions (as defined in subdivision 2.8.c) of these units before the project equals or exceeds the significant amount for that pollutant (as defined in subsection 2.74).

[§45-14-3.4(f)]

Hybrid test for projects that involve multiple types of emissions units. -- A significant emissions increase of a regulated NSR pollutant is projected to occur if the sum of the emissions increases for each emissions unit, using the method specified in subdivisions 3.4.c through 3.4.d as applicable with respect to each emissions unit, for each type of emissions unit equals or exceeds the significant amount for that pollutant (as defined in subsection 2.74).

Further, under the definition of “projected actual emissions” - Section 2.63(a)(4), the applicant may use an emission unit’s PTE in lieu of projecting actual emissions.

It is important to note that when any emissions decrease is claimed (including those associated with the proposed modification), the second step of the test is triggered - a determination if the project results in a “significant net emissions increase.” This determination is defined under the definition of “net emissions increase” [§45-14-2.46] and must include “any other increases and decreases in actual emissions at the major source that are contemporaneous with the particular change and are otherwise creditable.” A change is contemporaneous if it “occurs not more than five (5) years prior to the date on which construction on the particular change commences nor later than the date on which the increase from the particular change occurs.”

### ***PSD Applicability Analysis***

Based on the above, WVA Manufacturing included a PSD applicability analysis for the proposed modified sources as outlined in the Description of Process/Modifications above. The emission points associated with the changes are: EAF 15 emission points 016 and 017. For the EAF 15, “baseline actual emissions” were based - pursuant to the definition under §45-14-2.8.a.2 - on the existing permit limits since the unit has repeatedly operated in excess of the existing permitted emissions . In lieu of projecting actual emissions, EAFs PTE was used. The results of the determination of the emissions increase (the first step) is given in the following table:

<b>Pollutant</b>	<b>EAF 15 Past Actual Emissions (tpy)</b>	<b>EAF Proposed Emissions (tpy)</b>	<b>Increase (tpy)</b>	<b>Significant Level (tpy)</b>	<b>Significant?</b>
<b>NO<sub>x</sub></b>	171.81	462.00	290.19	40.00	Yes
<b>SO<sub>2</sub></b>	288.54	737.56	449.02	40.00	Yes
<b>CO</b>	226.98	243.11	16.13	100.00	No
<b>VOCs</b>	15.51	17.44	1.93	40.00	No

“Significant” is defined under §45-14-2.74(a). As shown in the preceding table, the change in emissions resulting from the proposed modifications does not exceed the definition of “significant” for CO or VOCs but does for SO<sub>2</sub> and NO<sub>x</sub>. In order to avoid PSD applicability WVA Manufacturing has proposed to permanently shut down Boiler #4. These reductions can only be included in the analysis as part of step 2 - the determination of a “significant net emissions increase.”

In order to claim a reduction for netting purposes, said reduction must have occurred (per 45CSR14.2.46.c) within the 5 years preceding the date upon which the actual construction or emission increase occurred. Boiler 4 last operated in September of 2007. Therefore the reduction is contemporaneous. WVA Manufacturing has stated that no other contemporaneous increases or decreases have occurred at the facility (Page N-3 of the permit application).

It is important to note that although 45CSR14.2.8.b generally allows an applicant to go back up to 10 years before the date actual construction of the modification begins in order to select representative baseline emissions data for netting purposes, in WVA Manufacturing’s specific case they may not go back any further than the time when Low NO<sub>x</sub> burners were installed on Boiler #4. This is because the NO<sub>x</sub> reductions due to the installation of those burners were already relied upon in the original netting performed by (then) Elkem Metals in 2000. The applicant selected 24 consecutive months used to establish the baseline past actual emissions from the boiler where calendar year 2004 and 2005. This is after the Low-NO<sub>x</sub> burners were installed.

Pollutant	Boiler 4 Past Actual Emissions (tpy) <sup>1</sup>	Boiler 4 Proposed Emissions (tpy)	Decrease (tpy)
NO <sub>x</sub>	373.50	0.00	-373.50
SO <sub>2</sub>	899.89	0.00	-899.89

<sup>1</sup>The applicant selected the 24 consecutive months from January 1, 2004 through December 31, 2005 as representative of past actual emissions. The applicant based these emission calculations on results from an April 27, 2004 stack test.

Therefore the “Net Emission Increase” under 45CSR14 is as follows:

Pollutant	Increases (tpy)	Decreases (tpy)	Change (tpy)
NO <sub>x</sub>	290.19	-373.50	-83.31
SO <sub>2</sub>	449.02	-899.89	-450.87

With the decrease in NO<sub>x</sub> and SO<sub>2</sub> emissions from the permanent shut down of Boiler #4, the net emissions increase of NO<sub>x</sub> and SO<sub>2</sub> falls below the significance level of 40 TPY. Therefore, the proposed modifications are not defined as a “major modification” and are not subject to PSD review.



#### 45CSR30: Requirements for Operating Permits.

The facility is a major source under 45CSR30 with an existing Title V permit. Changes authorized by the permit must also be incorporated into the facility's Title V operating permit.

#### FEDERAL RULES

Note that EAF 15 is **NOT** subject to the following rule:

#### 40 CFR 60 Subpart Z: Standards of Performance for Ferroalloy Production Facilities

Subpart Z would apply to EAF 15 if it were constructed or modified after May 4, 1976. However, EAF 15 was constructed and installed in 1941. Additionally, when the furnace was restarted in 1997, it apparently did not meet the definition of "modification" under Subpart A. Specifically, Subpart A excludes any increase in production that results without a "Capital Expenditure". "Capital Expenditure" is defined in Subpart A as "an expenditure for a physical or operational change to an existing facility which exceeds the product of the applicable 'annual asset guideline repair allowance percentage' specified in the latest edition of Internal Revenue Service (IRS) Publication 534 and the existing facility's basis as defined by section 1012 of the Internal Revenue Code." According to the facility's existing Title V fact sheet, EAF 15 meets this exemption.

#### TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

No non-criteria regulated pollutants are addressed in this application.

#### AIR QUALITY IMPACT ANALYSIS

Since the applicant netted out of PSD, no modeling was performed.

#### MONITORING OF OPERATIONS

Since the annual proposed emission limits in this permit are based on hourly stack tested emission rates multiplied by 8,400 hours per year, a new requirement to monitor hours of operation will be added to the permit. Additionally, a new requirement will be added to monitor the sulfur content and amount of the coal and charcoal mixture into EAF 15.

## CHANGES TO PERMIT R14-017B

The following changes will be made to R14-017B:

- \* Condition A.7 will be changed to increase permitted emission levels of VOCs, NO<sub>x</sub>, SO<sub>2</sub>, and CO.
- \* Condition A.8 will be modified to add an 8,400 hours per year operation limitation and a maximum coal and charcoal sulfur limit.
- \* Conditions A.18 and A.19 will be changed to eliminate requirements for the Boiler 4 ESP (since the boiler is being removed) and add the coal/charcoal monitoring requirements.
- \* Old conditions A.22 through A.29 and A.31 of the permit will be removed since they all deal with Boiler #4.
- \* New condition A.23 will be added to require the permanent shut down of Boiler #4.
- \* Old conditions B.6 through B.11 will be removed since they all deal with Boiler #4.

## RECOMMENDATION TO DIRECTOR

Information supplied in the application indicates that compliance with all applicable regulations will be achieved. Therefore it is the recommendation of the writer that permit R14-017C for the modification of an silicon metal manufacturing plant in Institute, Fayette County, be granted to WVA Manufacturing, LLC.

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Steven R. Pursley, PE  
Permit Writer

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April 9, 2012

Fact Sheet R14-017C  
WVA Manufacturing, LLC  
Alloy Facility